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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

ROE, JESSEE RANDALL

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/581,998	<b>Applicant(s)</b> MIRACLE ET AL.	
	<b>Examiner</b> JESSEE ROE	<b>Art Unit</b> 1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 7 June 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 1-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 7 June 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Status of the Claims***

Claims 1-26 are pending wherein claims 15-26 are currently under examination and claims 1-14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected method for refining the microstructure in titanium alloys containing boron in a single thermo-mechanical processing step wherein the boron-containing titanium alloy would have a fine-grain equiaxed microstructure Election was made without traverse in the Reply filed 26 May 2011.

### ***Drawings***

The drawings are objected to because they do not provide the corresponding Figure number with each drawing. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either

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“Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***. Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 15-26 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for Ti-6Al-4V-1.6B alloy and Ti-6Al-4V-2.9B alloy, does not reasonably provide enablement for all boron-containing titanium alloys. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. The claims include every possible boron-containing titanium alloy. One of ordinary skill in the art would require a substantial number of man-years to determine the full scope of the beta-phase superplasticity derived from the beta-phase strain rates for all boron-containing titanium alloys. The instant specification gives little direction and only gives only two alloy examples, i.e. Ti-6Al-4V-1.6B alloy and Ti-6Al-4V-2.9B. While the prior art does address some titanium alloys that exhibit superplasticity, the prior art is limited in terms of composition whereas the instant claims do not limit the

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composition of the boron-containing titanium alloys. The artisan would be faced with undue experimentation to determine the microstructural mechanism maps in order to determine the beta-phase superplasticity derived from the beta-phase strain rates associated with every boron-containing titanium alloy that is not Ti-6Al-4V-1.6B alloy or Ti-6Al-4V-2.9B alloy.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 15-26 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01.

In regards to claim 15, in order to conduct the step of "deforming a boron-containing titanium alloy under beta-phase strain rates and temperatures that correlate with the titanium alloy and boron content", a determination of the beta-phase strain rates for each particular composition must be determined. The specification indicates that a microstructural mechanism map must be made in order to determine the beta-phase strain rates. Therefore, the omitted step is providing a microstructural mechanism map.

With respect to the recitation "A method for achieving beta-phase superplasticity in titanium alloys" in lines 1-2 of claim 15 and the recitation 'deforming a boron-containing alloy under beta-phase strain rates and temperature that correlate with the titanium alloy and boron content" in lines 2-4 of claim 15, the Examiner notes that it is unclear how deforming a boron-containing titanium alloy under beta-phase strain rates

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and temperatures would provide a method for achieving beta-phase superplasticity in titanium alloys other than that specific boron-containing titanium alloy composition since every alloy would have a different microstructural mechanism map wherein the beta-phase strain rates would be different for each alloy.

In regards to claim 18, in order to conduct the step of "deforming a boron-containing titanium alloy under beta-phase strain rates and temperature determined in step a" in step (c) of claim 18, microstructural mechanism maps must be made to provide the beta-phase strain rates for each particular boron-containing alloy. Therefore, the omitted step is providing a microstructural mechanism map.

With respect to the recitation "deforming a boron-containing titanium alloy under beta-phase strain rates and temperatures determined in step a" in lines 6-7 of claim 18, the Examiner notes that step (a) added boron to the titanium alloy to form the boron-containing titanium alloy and step (a) does not require determining beta-phase strain rates and temperatures.

With respect to the recitation "deforming a boron-containing titanium alloy under beta-phase strain rates and temperatures" in lines 6-7 of claim 18, it is unclear "a boron-containing titanium alloy" in step c) is the same alloy as in steps a) and b).

With respect to the recitation "A method for achieving beta-phase superplasticity in titanium alloys" in lines 1-2 of claim 18 and the recitation "deforming a boron-containing alloy under beta-phase strain rates and temperatures determined in step a" in lines 6-7 of claim 18, the Examiner notes that it is unclear how deforming a boron-containing titanium alloy under beta-phase strain rates and temperatures would provide

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a method for achieving beta-phase superplasticity in titanium alloys other than that specific boron-containing titanium alloy composition since every alloy would have a different microstructural mechanism map wherein the beta-phase strain rates would be different for each alloy.

With respect to the recitation "wherein the boron-containing titanium alloy comprises an alloy selected from the group consisting of Ti-5Al-2.5Sn, Ti-6Al-4V, Ti-5.5Al-1Fe, Ti-6Al-2Sn-4Zr-2Mo, Ti-6Al-2Sn-4Zr-6Mo, Ti-6Al-Mo-1V, Ti-10V-2Fe-Mo, Ti-4.5Fe-6.8Mo-1.5Al, Ti-5Al-1Fe, Ti-8Mn, and CP Ti" in claim 24, it is unclear if boron is included in the alloy or not since boron alone or a quantity of boron is not specified in the alloy compositions. Additionally, the Examiner notes that CP Ti is not an alloy, but rather just commercially pure titanium.

With respect to the recitation "wherein the boron-containing titanium alloy comprises Ti-6Al-4V" in claim 25, it is unclear if boron is included in the alloy or not since boron alone or a quantity of boron is not specified in the alloy compositions.

The following is a quotation of the fourth paragraph of 35 U.S.C. 112:

A claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

Claims 23-25 is rejected under 35 U.S.C. 112, fourth paragraph, as failing to properly specify a further limitation of the subject matter of a claim from which it depends.

Claim 23 recites "The method of claim 33". However, the claims consist of claim number 1-26. Therefore claim 23 fails to further limit as a dependent claim.

Claim 18 recites the step of "adding boron to a titanium alloy to form a boron-containing titanium alloy". However, claim 24 recites "wherein the boron-containing titanium alloy comprises an alloy selected from the group consisting of Ti-5Al-2.5Sn, Ti-6Al-4V, Ti-5.5Al-1Fe, Ti-6Al-2Sn-4Zr-2Mo, Ti-6Al-2Sn-4Zr-6Mo, Ti-6Al-Mo-1V, Ti-10V-2Fe-Mo, Ti-4.5Fe-6.8Mo-1.5Al, Ti-5Al-1Fe, Ti-8Mn, and CP Ti". The Examiner notes that none of the alloys set forth have had boron included in the alloy. Therefore, claim 24 fails to further limit claim 18.

Claim 18 recites the step of "adding boron to a titanium alloy to form a boron-containing titanium alloy". However, claim 25 recites "wherein the boron-containing titanium alloy comprises Ti-6Al-4V". The Examiner notes that none of the alloys set forth have had boron included in the alloy. Therefore, claim 25 fails to further limit claim 18.

### ***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 26 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Huang (US 5,131,959).

In regards to claim 26, Huang ('959) discloses a structural metal element (part) comprising a boron-containing titanium aluminide (claim 1).

With respect to the recitation "formed by the method of claim 15" in claim 26, the patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. MPEP 2113. Since claim 26 is a product-by-process claim and the exact scope of the product cannot be determined, a 102/103 rejection is proper. MPEP 2183.

Claims 15-25 are free from art rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessee Roe whose telephone number is (571)272-5938. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jessee Roe/  
Primary Examiner, Art Unit 1733